[illegible], [illegible], [illegible], A. [illegible]

Spectrum, Solar

Investigating the spectra of a large chromosphere flare [illegible], A[illegible].
Izv. Krym. astrofiz. obser. [illegible], [illegible].

Monthly List of Russian Accessions, Library of Congress
June 1953. UNCL.

MUSTEL', E. R.

Sun - Flocculi

Physical nature of calcium flocculi. Izv. Krym. astrofiz. obser. No. , 19 .

Monthly List of Russian Accessions, Library of Congress
June 1953. UNCL.

MUSTEL', E. R.

USSR/Astronomy - Spectroheliograms 1 Jan 52

"Interpretation of Calcium and Hydrogen Spectroheliograms," E. R. Mustel', Crimean Astrophys Obs of Acad Sci USSR

"Dok Ak Nauk SSSR" Vol 82, No 1, pp 21-24

Considers main problem to be the source of the energy radiated by the floccules in the lines H, K, Ca-II and in the lines of the Balmer series (mainly the lines H_{alpha} and H_{beta}, the remaining lines show dim floccules in the heliograms). Discusses 2 possibilities: (a) the indicated energy

230T51

may be the result of fluorescence processes in the chromosphere over the flares; or (b) the chromosphere over the flares is heated anomalously strongly (unusual increase in the kinetic temp of the chromosphere). Submitted by Acad G. A. Shayn 5 Nov 51.

230T51

PA 24T78

USSR/Physics - Quantum Mechanics; Electric Modeling Mar 52

"Electrical Modeling of the Wave Equation of Quantum Mechanics: Investigation of Potential Barriers," Ya. R. Mustel', [illegible]

"Zhur Tekh Fiz" Vol 22, No 3, pp 369-381

Describes theoretical and experimental modeling of the penetration of waves through a potential barrier; this effect can be studied analytically only for a wave barrier of rectangular form because the special tabulated functions needed are not available.

24T78

Obtains agreement of theory and experiment for the rectangular barrier case and then proceeds to a barrier having a potential function of the form $U(x) = U_0/\cos h^2 ax$, where the wave processes are described by hypergeometric functions. Thanks P. Ye. Krasnushkin for direction of work. Submitted 29 Mar 51.

24T78

MUSTEL', E. R.

235T64

USSR/Astronomy - Supernovae 21 Jul 52

"Problem of the Origin of Supernova Explosions," E. R. Mustel', Crimean Astrophys Obs, Acad Sci USSR

"Dok Ak Nauk SSSR" Vol 85, No 3, pp 505-507

Proposes that the masses of supernovae must be much larger than the masses of novae. Presents various arguments for the possible presence of large masses in supernovae. States that further investigations are needed on binary systems, such as TCrB, by way of studies of position of emission bands and lines of absorption in the

235T63

spectra of repeated novae and dwarfs (stars of gM class). Submitted by Acad G. A. Shayn 26 May 52.

(PA 56 no. 671: 7340 '53)

235T63

MUSTEL', E.R.

Problem of the escape of matter from stationary stars. Izv.Krym. astrofiz.obser. 10:143-151 '53. (MLRA 7:5)
(Stars)

MUSTEL', E.R.

Bolometric corrections and color indexes for stars of early classes. (MLRA 7:5)
Trudy GAISH 22:12-20 '53.
(Stars)

MUSTEL, E. R., GALKIN, L. S., KOPYLOV, I. V.

"Spectrophotometry of Gamma Cassiopeiae"
Izv. Krymsk. Astrofiz. Observ., 11, 1954, pp 59-73

A total of 12 spectrograms of gamma-Cas. obtained by means of the 1,200 mm reflectors of Crimea Observatory and the spectrograph constructed by V. A. Albitskiy are analyzed. Iron-arc spectrum was used for comparison. Microphotograms were obtained by self-recroding Moll's microphotometer. Data are tabulated and compared with quantum number n of Balmer series. (RZhAstr, No 11, 1 54)

SO: W-31187, 8 Mar 55

'USHYL E. F.

The Mechanism of Glow of Hydrogen Flocculi. Izv. Krymsk. Astrofiz. Obser., 11, 1954, 102-128.

From continuations of previous investigations (ibid. 9(1952)) author concludes that the H lines delta, epsilon and zeta are not formed in the chromosphere, but in more deeply located layers. The H alpha line is due to excitation of H by electron impact in the chromosphere and to recombination of protons with electrons. The decrement of Balmer lines in flocculi spectra and the whirls around spots are analyzed. (RZhAstr, No 3, 1954)

SO: W-31128, 11 Jan 55

MUSTEL, E. R. and GALKIN, L.S.

"Study of Stars of Spectral Classes A and F With Anomalous Intensities of Metallic Lines" Izv. Krymsk, astrofiz. observ., 12, 1954, 148-161

The relatively small content of neutral and singly ionized atoms of some metals in "metallic" stars may be due to several causes: deviation from normal state, i. e., from the state, i. e., from the state to which most of the main sequence stars belong and anomalous excitation conditions, as produced by strong ultraviolet radiation fields, created by recombination of ionized H atoms. It is exhibited by the difference of profiles of Balmer series and confirms a real deviation of the chemical compound from that of main sequence stars. (RZhAstr, No 10, 1955)

SO: Sum-No. 787, 12 Jan 56

MUSTEL, E.R.

"Problem of the Mechanism of Luminosity of Flocculi in Lines H_2 and Ca_2," Izv. Krymsk. Astrofiz. Observ., 11, 1954, pp 165-169

The role of recombination in the luminosity of H_2 and Ca_2 lines in the spectra of flocculi is analyzed. Experimental results point to the conclusion that this luminosity is due not to recombination, but rather to electron impact. (RZhAstr, No 2, 1955)

SO: Sum. No. 536, 10 Jun 55

MUSTEL', E.R.

USSR/ Physics - Astrophysics

Card 1/1 Pub. 43 - 9/97

Authors : Severnyy, A. G., and Mustel', E. R.

Title : Study of spectra of chromospheric flashes on the sun

Periodical : Izv. AN SSSR. Ser. fiz. 18/2, page 249, Mar-Apr 1954

Abstract : Brief report is presented on the analysis of spectra of chromospheric flashes observed on the sun. The analyzed spectra, photographed by means of a spectrohelioscope, pertain to a larger chromospheric fulmination observed on August 5, 1949 which was followed by a 10-minute break in short-wave radio reception and sharp increase in radio-radiation of the sun.

Institution : Academy of Sciences USSR, The Crimean Astrophysics Observatory

Submitted : .....

Mustel, E. R.

The radiation mechanism of helium flocculi. E. R. Mustel. *Doklady Akad. Nauk S.S.S.R.* 97, 635-8(1954).—Along with ordinary chromospheric material, solar flocculi (like prominences) also contain some very hot material. Although there may be an electromagnetic barrier between these 2 phases, some electrons may be able to penetrate into the condensed chromospheric streamers and ionize atoms in them. M. calcs. that there are approx. 3×10^8 coronal electrons per cc. capable of accomplishing this. Coronal material has a negligible effect on optical excitation of neutral and singly ionized metallic atoms in the chromosphere. Cyrus Feldman

BRODSKAYA, E.S.; SEVERNYY, A.B., doktor fiz.-mat.nauk, otv.red.; SHAYN, G.A., akademik, red.; MUSTEL', E.R., red.; DOBRONRAVIN, P.P., kand.fiz.-mat.nauk, red.; GUROV, K.P., red.izd-va; POLYAKOVA, T.V., tekhn.red.

[Catalog of spectral classes, magnitudes, and color indices of 5752 stars in the area of the Milky Way with the center $\alpha = 23^h25^m$, $\delta = 61^\circ30'$] Katalog spektral'nykh klassov, velichin i pokazatelei tsveta 5752 zvezd v ploshchadke Mlechnogo Puti s tsentrom $\alpha = 23^h25^m$, $\delta = 61^\circ30'$. Moskva, Izd-vo Akad.nauk SSSR, 1955. 137 p. (Akademiia nauk SSSR. Krymskaia astrofizicheskaia observatoriia. Izvestiia, v.14). (MIRA 12:11)

1. Chlen-korrespondent AN SSSR (for Mustel')
(Stars--Catalogs)

AMBARTSUMYAN, V.A., akademik, redaktor; MUSTEL', E.R., redaktor; PARENAGO P.P., redaktor; KUKARKIN, B.V., doktor fiziko-matematicheskikh nauk; MARTYNOV, D.Ya., doktor fiziko-matematicheskikh nauk, redaktor; MASEVICH, A.G. kandidat fiziko-matematicheskikh nauk, redaktor; LEYKIN, G.A. kandidat fiziko-matematicheskikh nauk, redaktor; YEFREMOV, Yu.I., redaktor; POLYAKOVA, T.V., tekhnicheskiy redaktor.

[Transactions of the Fourth Conference on Problems of Cosmogony: non-stationary stars] Trudy chetvertogo soveshchaniia po voprosam kosmogonii; nestatsionnarnye zvezdy. Moskva, Izd-vo Akademii nauk SSSR, 1955. 512 p. (MLRA 8:12)

1. Chlen-korrespondent AN SSSR (for Mustel' and Parenago)
2. Soveshchaniye po voprosam kosmogonii. 4th Moscow, 1954. (Stars)

MUSTEL', E.R.

USSR/ Astronomy - Solar eclipse

Card 1/1 Pub. 124 - 4/45

Authors : Mustel', E. R. Memb. Corresp. of Acad. of Sc. USSR., and Vitkevich V. V.

Title : The physics of the sun

Periodical : Vest. AN SSSR 2, 25-32, Feb. 1955

Abstract : The preliminary results obtained by studying the total solar eclipse of June 30, 1954 are discussed. The urgent need for universal study of the sun in order to establish the connection between the activity of the sun and the pertinent changes occurring in the terrestrial atmosphere is emphasized. It is pointed out that the physical conditions of the external and internal sections of the sun do not remain constant but change periodically each 11 years. The maximum effect of these physical changes of the sun is felt mostly in the ionosphere which leads sometimes to sudden changes in the conditions of short wave radio communication, changes in the terrestrial magnetic field, and so forth.

Institution : .....

Submitted : .....

MUSTEL', E.R.; GALKIN, L.S.

Investigating stars of spectral classes A and F with anomalous intensities of metal lines. Izv.Krym.astrofiz.obser. 13:9-22 '55. (MIRA 13:4)

(Stars--Spectra)

MUSTEL', E.R.

Origin of the continuous spectrum of chromospheric flares.
Izv.Krym.astrofiz.obser. 15:54-68 '55. (MIRA 13:4)
(Spectrum, Solar)

SEVERNYY, A.B.; MUSTEL', E.R.

Investigating the chromospheric flare of June 13, 1950. Izv. Krym.astrofiz.obser. 13:82-95 '55. (MIRA 13:4)
(Sun)

MUSTEL', E.R.

Ejection of matter from chromospheric flares. Izv.Krym.astrofiz. obser. 15:95-103 '55. (MIRA 13:4)
(Sun)

MUSTEL', E.R.

Chromosphere above sunspots. Izv.Krym.astrofiz.obser. 13:96-102 '55. (MIRA 13:4)
(Sunspots)

MUSTEL', E.R.; GALKIN, L.S.

Investigating A and F-type stars with anomalous intensities of metal lines. Part 3. Spectrophotometry of Castor B. Izv. Krym.astrofiz.obser. 15:136-139 '55. (MIRA 13:4)
(Stars--Spectra)

E

MUSTEL', Ye.R.

Electromagnetic oscillations in a parabolic pipe as a particular case of interaction via the neck of two hollow vessels. Zhur. tekh.fiz. 25 no.10:1788-1799 S '55. (MLRA 9:1)
(Electric waves)

MUSTEL, E.R.

2

Corpuscular emission from the sun. E. R. Mustel.

Astron. Zhur., 32, 177-91(1955); cf. *C.A.* 48, 11916d; preceding abstr.—The outer parts of coronal rays cannot be regarded as the corpuscular streams which produce geomagnetic disturbances as they approach the earth. Ca^+ ions are repelled from the sun by light pressure; the magnetic lines of force encircling this current prevent the access of electrons to the Ca^+ ions. This current entrains H atoms. The sun cannot lose more than 6×10^{11} g./yr.

Cyrus Feldman

MUSTEL', Ye. R.

"On the Magnetic Fields of Naval and Supernaval," paper read at the Symposium on Electromagnetic Phenomena in Cosmical Physics, Stockholm, 27 31 Aug 56.

Sternberg Inst., Moscow

Mustel, E. R.

"Study of the Physics of the Sun," (from the program of the International Geophysical Year), by E. R. Mustel', Corresponding Member of the Academy of Sciences USSR, Vestnik Akademii Nauk SSSR, No 11, Nov 56, pp 46-49

The article presents the scope of Soviet work on solar observations and studies in connection with the International Geophysical Year. Listed are a number of stations of the Solar Service of the USSR located in the Far East.

GM. 1305

MUSTEL', E.R.; TSAP, T.T.

Spectrophotometry of lines of the infrared triplet of ionized calcium λλ 8498, 8542, and 8662 in flocculi. Izv.Krym. astrofiz.obser. 16:67-72 '56. (MIRA 13:4)
(Sun--Flocculi--Spectra)

MUSTEL', E.R.; KUMAYGORODSKAYA, R.N.

Spectrophotometry of GO and KO-type stars with weak and strong lines. Izv.Krym.astrofiz.obser. 16:122-128 '56.
(MIRA 13:4)
(Stars--Spectra)

MUSTEL', E.R.

Physics of flocculi and corpuscular emission of the sun. Izv. Krym.astrofiz.obser. 16:206-207 '56. (MIRA 13:4)
(Sun--Flocculi) (Solar radiation)

MUSTEL', E.R.

Spectroscopy of stars. Izv.Krym.astrofiz.obser. 16:221-222 '56.
(Stars--Spectra) (MIRA 13:4)

MUSTEL', E.R.

Magnetic fields of novae. Astron.zhur. 33 no.2:182-204 Mr-Ap '56.
(MLRA 9:8)

1. Krymskaya astrofizicheskaya observatoriya Akademii nauk SSSR.
(Magnetic fields) (Stars, New)

MUSTEL', E. R.

PHASE I BOOK EXPLOITATION 347

Mustel', Eval'd Rudol'fovich.

Solntse i atmosfera Zemli (The Sun and the Earth's Atmosphere) Moscow, Gostekhizdat, 1957. 101 p. 25,000 copies printed.

Ed.: Rakhlin, I. Ye.; Tech. Ed.: Pletneva, T. S.

PURPOSE: The book is intended for students, teachers, and lecturers. It may prove useful to specialists in the field of radio communication and in the field of terrestrial magnetism.

COVERAGE: The book contains a popular scientific account of the influence of the sun on the earth's atmosphere. The first part of the book is devoted to the description of the sun and of the processes occuring on its surface. The effect of ultraviolet and corpuscular solar emission on the upper layer of the earth's atmosphere is then disclossed. The study of these problems is important in the field of radio communication. A special section contains a short description of the known facts on the influence of the sun on the weather.

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The Sun and the Earth's Atmosphere

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The last part of the book is devoted to the study of solar influences on the earth. This study was conducted during the International Geophysical Year. There are 3 references, all Soviet.

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JS/gmP
May 26, 1958

MUSTEL', E.R.; TSAP, T.T.

Comparison of hydrogen and calcium spectroheliograms and the excitation of hydrogen atoms in flocculi. Izv.Krym.astrofiz. obser. 17:162-176 '57. (MIRA 13:4)
(Sun--Flocculi--Spectra)

AUTHOR: Mustel', E. R.

TITLE: The physical nature of the differences between geomagnetic disturbances with sudden and non-sudden commencement. (O fizicheskoy prirode razlichiy mezhdu geomagnitnymi vozmushcheniyami s vnezapnym i postepennym nachalom).

PERIODICAL: Astronomicheskii Zhurnal, 1957, Vol.34, No.1, pp.120-126.

ABSTRACT: Geomagnetic disturbances may be divided into two main groups: (i) disturbances with sudden commencement (SC), and (ii) disturbances with a non-sudden commencement (non-SC). There are considerable differences between these two groups. The following are some of them: (a) the distribution of the disturbances within a cycle of solar activity is quite different for the two groups; (b) the non-SC disturbances have a 27-day periodicity and are delayed with respect to the appearance of sunspots, whereas the SC disturbances follow the spots quite closely; (c) the duration of the non-SC disturbances may be up to 10 days, as opposed to 24-36 hours for the SC type. There are a number of other differences.

In the present paper the differences in the character of the corpuscular streams themselves are briefly considered.

Properties of SC disturbances indicate that they should be closely connected with sunspots. However, these disturbances are not directly caused by the sunspots. Thus,

The physical nature of the differences between geomagnetic disturbances with sudden and non-sudden commencement. (Cont.)

in the case of strong geomagnetic disturbances, the strong chromospheric flares appear to cause the disturbances. The flares themselves are closely connected with the sunspots (1). Furthermore, observations of radio emission of the sun show that, during such strong flares, a flow of a disturbing agent takes place in the outward direction. Studies of this radio emission indicate that the atoms, of which the streams are probably composed, have a complex velocity spectrum. All this is connected with strong geomagnetic disturbances. In the case of moderate and weak disturbances the situation is more obscure. They could also be connected with flares but of smaller intensity.

Latest researches suggest that the ejection of atoms from intense chromospheric flares and the appearance of the flares themselves are a consequence of a specific complex non-stationary electromagnetic process. If the ejection of atoms from flares is caused by bright radiation, then the only mechanism which could be responsible for this is radiation pressure. It has, however, been shown in ref.(6) that this hypothesis meets with serious difficulties. Other, more serious difficulties are brought out by the study of the velocity spectrum of particles ejected from flares. These velocities are of the order of 1000 km/sec or more, so that radiation pressure cannot play a part in this process. If this is so, then it is quite possible that the suggested

The physical nature of the differences between geomagnetic disturbances with sudden and non-sudden commencement. (Cont.)

non-stationary electromagnetic process is not always accompanied by a bright chromospheric flare, and the ejection of particles may take place in the absence of such flares, and vice versa.

The identical character of strong and weak SC-disturbances shows that in all cases of ejected corpuscules one deals with the same non-stationary electromagnetic process as when bright flares are present. It follows that areas at which specific non-stationary phenomena occur, together with an increase in radio emission and a shift of the level of radio emission in the corona, should be the sources of particles which cause SC disturbances. It is conjectured that these areas should have an unstable character and be somehow connected with sunspots.

Disturbances with non-SC characteristics are, in the author's opinion, caused by flocculi. This is confirmed by the fact that the passage of flocculi through the centre of the sun's visible disc is accompanied by geomagnetic disturbances.(Refs. 7,8,9). The author also considers that the difference in the character of SC and non-SC disturbances is conditioned by physical (rather than geometrical) characteristics of the corresponding streams. Observations

The physical nature of the differences between geomagnetic disturbances with sudden and non-sudden commencement. (Cont.)

have established that the velocity v of condensations in streams giving rise to SC disturbances is higher than the velocity in the streams giving rise to non-SC disturbances.

If one takes a simple model for the first phase of geomagnetic disturbances, in which losses of kinetic energy of the particles in the stream cause changes in the magnetic field H of the Earth, the rate of change of this field dH/dt is proportional to nv^3, where n is the concentration of the atoms in the stream at the distance of the Earth from the Sun. This shows that the rate of change dH/dt should be higher for streams giving rise to SC-disturbances (higher velocity).

In addition, condensations ejected from the region of sunspots and causing SC disturbances, have their own considerable "frozen" magnetic field. This should also cause additional variations in the Earth's magnetic field. Considerations show that the field of the condensations, causing non-SC disturbances should be much smaller.
1 Figure, 13 references, 5 of which are Russian.

Crimea Astrophysical Observatory
Ac.Sc. USSR.

Recd. Nov. 1, 1956.

MUSTEL', E.R.; BOYARCHUK, A.A.

Symposium on "The stars with bright lines" in Liège in July 8-10, 1957. Astron. zhur. 34 no.6:962-965 N-D '57. (MIRA 11:2)
(Stars—Spectra)

MUSTEL, E. R. (Prof.)

"Corpuscular streams for the plages and the physical properties of the streams," paper presented at 10th General Assembly, Int'l Astronomical Union, Moscow, Aug 1958.

MUSTEL', E.R.; DVORYASHIN, A.S.

Solar activity and geomagnetic disturbance from 1942-1944 [with summary in English]. Astron. zhur. 35 no.1:3-17 Ja-F '58. (MIRA 11:3)

1. Krymskaya astrofizicheskaya observatoriya AN SSSR.
(Sun--Flocculi) (Magnetic storms)

3(1) SOV/33-35-2-2/21

AUTHORS: Mustel', E.R., and Mitropol'skaya, O.N.

TITLE: Flocculi (Plages) and the Twenty-Seven Day Recurrence Tendency in Magnetic Disturbances (Flokkuly i dvadtsatisemidnevnaya povtoryayemost' geomagnitnykh vozmushcheniy)

PERIODICAL: Astronomicheskiy zhurnal, 1958, Vol 35, Nr 2, pp 194-207 (USSR)

ABSTRACT: The present paper is a continuation of the preceding publications [Ref 1,2] and contains a comparsion of the 27 day sequences of geomagnetic disturbances during the years 1929 - 1933 and the flocculi. The authors used the Meudon and Zürich synoptic maps, observations of the Coimbra and Ebro - Observatory as well as the K-indexes of N.P. Ben'kova. The result of the investigation is the assertion that all 11 considered sequences of geomagnetic disturbances can be combined in a natural manner with the passage of the flocculi across the visible center of the solar disk. Some corrections concerning this assertion are already mentioned in [Ref 1] and [Ref 2].

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33-35-3-5/27

AUTHOR: Mustel',E.R.

TITLE: Corpuscular Streams During the Years of Minimum Solar Activity and Their Properties (Korpuskulyarnyye potoki v gody minimuma solnechnoy aktivnosti i ikh svoystva)

PERIODICAL: Astronomicheskiy zhurnal, 1958,Vol 35,Nr 3,pp 351-365 (USSR)

ABSTRACT: At the beginning of the paper the main former results of the author and others [Ref 1 - 4] are summarized. In these investigations it has been shown that practically all separate geomagnetic disturbances and sequences of disturbances during the years of minimum solar activity are caused by plages which pass over the visible center of the solar disk and that therefore the corresponding corpuscular streams from plages are approximately radial.
The problem of the velocity of corpuscles from plages is discussed. These velocities ν are found from the time-lag Δt of the disturbances (see fig.1). From [Ref 2 - 4] it follows that statistically the value of ν decreases with the phase of the solar cycle in the direction towards the minimum of solar activity. At moments close to the minimum activity (though before minimum) the mean velocities of the corpuscles are very small, of the order of 200-300 km/sec. Simultaneously with the de-

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Corpuscular Streams During the Years of Minimum Solar Activity and Their Properties

crease of ν and therefore with the increase of Δt towards minimum activity, the mean duration of the disturbances ΔT statistically increases; during the years of minimum activity ΔT amounts to 10-15 days. Such large values of ΔT cannot be the result of a large solid angle of the corpuscular streams, as it is just during the years of minimum activity that the radiality of the streams is maximum [Ref 5, 2-4] . The simultaneous increase of Δt and ΔT and the large values of ΔT - all this is naturally explained by the dispersion of velocities in the stream and by the specific form of the dependence between Δt and ν (see fig 1). For one and the same value of the dispersion of velocities $\Delta\nu$ in the stream, the value of ΔT increases rapidly with the decreasing ν and therefore with the increasing Δt. For example, if for all the streams $\Delta\nu$ = 100 km/sec then for ν = 1000 km/sec the value ΔT will be equal to only nine hours, for ν = 250 km/sec ΔT will be more than seven days. Therefore the increase of ΔT with Δt is the result of the velocity dispersion of the corpuscles in the stream and the decrease of the mean velocities of the corpuscles towards minimum.

Attention is called to the fact that often the range of varia-

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Corpuscular Streams During the Years of Minimum Solar Activity and Their Properties

tions of the magnetic field during a long disturbance (with a large Δ T) remains constant or decreases but very slightly towards the end of the disturbance. But it is difficult to understand this if the main energy of the corpuscles is their kinetic energy, and a velocity dispersion in the stream is present. In connection with this the main conclusion of the present investigation is made: in many cases the energy of the "frozen-in" magnetic field of the corpuscular condensations can considerably exceed their kinetic energy. This conclusion is confirmed by quantitative estimates according to formulae (1) and (2). It is indicated that the existing estimates of the strength of the "frozen-in" magnetic field, made on the basis of the study of variations of cosmic rays assuming a homogeneous structure of the streams [Ref 10], must be reconsidered because corpuscular streams consist in reality of separate relatively dense condensations. It seems that the strength of the "frozen-in" field of the condensations which give rise to disturbances with a sudden commencement amounts to $5 \cdot 10^{-4}$ oersted and the strength of the field of condensations which cause disturbances with a sudden commencement amounts to 10^{-2} oersted. It is possible that the presence of a noticeable magnetic field in corpuscular condensations might explain the large accelerations which are found from the motion of ionized molecules, H_2^+ and

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Corpuscular Streams During the Years of Minimum Solar Activity and Their Properties

124, in armed table. The relation between the magnetic and the kinetic energy can vary from one stream to another and from one condensation to another. This might explain the lack of [illegible] often observed between corpuscular and geomagnetic disturbances. The possible mechanisms of the ejection of corpuscles from active solar regions are discussed and the main observational problems for studying this question outlined. A possible explanation of the distribution of geomagnetic disturbances with sudden and recurrent commencements in the solar cycle [Ref 21] is given. In conclusion some questions of the "coronal" hypothesis are critically discussed. In addition to the already discussed difficulties which this hypothesis meets [Ref 30] new difficulties are added. In particular, the statistical results derived by W. Roberts and J. Pecker [Ref 31] are considered. The author shows that the I- and Q-curves constructed by Roberts and Pecker are not at all an argument in favour of the coronal theory; [illegible] to interpret these

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MUSTEL', E.R.; GALKIN, L.S.; KUMAYGORODSKAYA; BOYARCHUK, M.Ye.

Quantitative spectral classification of F0-K5 stars with well determined distances. Izv.Krym.astrofiz.obser. 18: 3-37 '58. (MIRA 13:4)
(Stars--Classification)

MUSTEL', E.R.; MITROPOL'SKAYA, O.N.

Relationship between calcium flocculi and geomagnetic and ionospheric disturbances. Izv.Krym.astrofiz.obser. 18: 162-181 '58. (MIRA 13:4)
(Sun--Flocculi) (Magnetic storms)

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Translation from: Referativnyy zhurnal, Astronomiya i Geodeziya, 1959, No. 3, p. 28, # 1887

AUTHOR: Mustel', E. R.

TITLE: The Problem of Outflow of Substance from Stationary Stars

PERIODICAL: Izv. Krymsk. astrofiz. observ., 1958, Vol. 19, pp. 153-164 (English summary)

TEXT: The problem is discussed on calculating the mass lost by the Sun yearly as a result of corpuscular radiation. Arguments are adduced that the mass value amounts to 10^{18} g/year. The consideration of the mechanism of matter ejection from the solar surface emphasizes the difficulties of studying mass losses by other stationary stars. It is suggested to base the estimates of the secular mass losses of these stars on the studies of effects caused by the ejected substance in the star surrounding space. The author considers the possibility of detecting the matter outflow from stars by studying emission lines in their spectra, in particular the $H\alpha$ line. It was found that the $H\alpha$ line is too weak for detecting the effect in question. An other possibility is pointed

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The Problem of Outflow of Substance from Stationary Stars

out, when the outflow of matter from a star proceeds into a diffuse nebula. In this case a shell should form which expands under the action of corpuscles ejected from the star surface and braked by the shell. The mass of the shell will increase both on account of the matter outflowing from the stellar surface and captured by the shell and on account of the nebular substance carried along by the shell during its expansion. The equation of motion of such a shell is composed which looks as follows:

$$\frac{d^2R_a}{dt^2} = \frac{4\pi R_o^2 \rho_o (v_o - v_a)^2 - 4\pi R_a^2 \rho_c v_a^2}{m_o + 4\pi R_o^2 \rho_o [v_o t - R_a + R_{a_o}] + \frac{4}{3}\pi \rho_c (R_a^3 - R_{a_o}^3)},$$

where R_a is shell radius, v_a its velocity, R_o is radius of a sphere beyond which the gravitation of the star may be neglected; v_o is speed of the atoms ejected from the star at $R = R_o$; ρ_o is matter density at the R_o level; ρ_c is inter-stellar medium density. The solution of this equation is supposed to be given by the author in an other article.

I. N. Minin

Translator's note: This is the full translation of the original Russian abstract.

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MUSTEL', E.R.; TSAP, T.T.

Spectrophotometry of the three infrared lines of ionized calcium $\lambda\lambda$ 8498, 8542, 8662 in flocculi. Part 2. General characteristic properties of lines of the infrared triplet in spectra of flocculi and sunspots. Izv. Krym. astrofiz. obser. 20:74-79 '58.
(MIRA 13:3)

(Sun--Flocculi--Spectra)
(Sunspots--Spectra)

MUSTEL', E.R.; BOYARCHUK, M.Ye.

Absorption spectrum of Nova Herculis, 1934, at its maximum.
Izv. Krym. astrofiz. obser. 20:86-100 '58.
(MIRA 13:3)

(Stars, New--Spectra)

MUSTEL', E.R.; KUMAYGORODSKAYA, R.N.

Emission bands in the spectrum of Nova Herculis, 1934. Izv. Krym. astrofiz. obser. 20:101-117 '58. (MIRA 13:3)
(Stars, New--Spectra)

PARIYSKIY, N.N., kand. fiz.-mat. nauk, otv. red.; KONONOVICH, E.V., red.; KUZ'MIN, A.D., kand. tekhn. nauk, red.; MOGILEVSKIY, E.I., kand. fiz.-mat. nauk, red.; MUSTEL', E.R., red.; YEGOROVA, N.B., red. izd-va, KASHINA, P.S., tekhn. red.

[Total solar eclipses of February 25, 1952 and June 30, 1954; proceedings of the expedition] Polnye solnechnye zatmeniia, 25 fevralia g. i 30 iiunia 1954 g.; trudy ekspeditsii. Moskva, 1958. 357 p. (MIRA 11:12)

1. Akademiya nauk SSSR. Ekspeditsiya po nablyudeniyu polnykh solnechnykh zatmeniy, 1952 i 1954. 2. Chlen-korrespondent AN SSSR (for Mustel').

(Eclipses, Solar)

BRAGINSKIY, V.B.; MUSTEL', Ye.R.

Experimental investigation of the radiation by electron lumps in the neighborhood of inhomogeneities. Izv.vys;ucheb.zav.; radiofiz. 1 no.3: 124-127 ' 58. (MIRA 12:1)

1. Moskovskiy gosudarstvennyy universitet.
(Microwaves)

SUBMITTED: December 7, 1957

AUTHORS: Golubkov, P.V. and Talantov, Sh. Ye. SOV/109-3-5-22/23

TITLE: The Second All-Union Conference on Radioelectronics of the Ministry of Higher Education of the USSR (Vtoraya vsesoyuznaya konferentsiya MVO SSSR po radioelektronike) - News Item

PERIODICAL: Radiotekhnika i Elektronika, 1958, Vol 3, Nr 5, pp 440 - 444 (USSR)

ABSTRACT: The conference took place during September 23 - 29, 1957 at Saratovskiy gosudarstvennyy universitet imeni N.G. Chernyshevskogo (Saratov State University imeni N.G. Chernyshevskiy). Apart from the universities, the conference was attended by the representatives of the scientific research institutes of the Soviet and Ukrainian Academies of Science, various industrial establishments and the interested ministries. This arrangement stimulated the discussion and evaluation of the papers presented and permitted the determination of plans for the future research to be carried out by the universities in the field of radioelectronics. The papers During the plenary session on September 23, the papers were read: "Development Trends of UHF Electronics in the Soviet Union" by M.D. Devyatkov and "Electromagnetic Waves in the System of Uni-directional Electron Beams" by V.M. Lopukhin. M.D. Devyatkov presented numerous factual data illustrating the rapid development of the U.H.F. electronics in the Soviet Union and the vast contribution of the Soviet scientists to the theoretical foundations of this science; he also discussed the development trends of U.H.F. electronics in the immediate future. The paper described a number of original Soviet U.H.F. devices. The work of V.M. Lopukhin was concerned with the theoretical investigation of the phenomena taking place in multi-ray devices whose electron beams have different directions. The author showed that the presence of the electron beams which are perpendicular to the axis facilitates the appearance of the solutions which are increasing functions of x for the case of a ray directed along the axis z; it also leads to the appearance of exponentially increasing solutions in the presence of one beam in the above direction. The Electronics Section comprised 50 papers; more than one-third of these were concerned with the theoretical and experimental investigation of wide-band electronic devices for U.H.F. The lecture by V.E. Shevchik, L.Ya. Kayofis and L.B.Petrovskiy dealt with the extension of the known theories of travelling-wave tubes and backward-wave tubes to the practically important case when the delay structure necessitated the taking into account of the discrete character of the interaction of the electron beam with the high-frequency field. The lecture by V.C. Stal'makhov, V.M. Shevchik and Yu.D. Zharkov was devoted to the simplified analysis of the operation of a backward-wave tube by employing the cosinusoidal approximation of the given field. The papers by V.B. Brazinskiy, A.S. Gorshkov, A.I. Kostrukov, G.P. Lyubimov, I.F. Trofimenko and V.I. Anisimov were concerned with the detailed experimental and theoretical investigation of the possibility (first indicated by V.M. Shevchik in 1954) of expanding the bandwidth of the electronic tuning of reflex klystrons by means of the mutual synchronisation of several klystron tubes. The operation of reflex klystrons with multi-circuit resonant systems was also investigated. The results of experimental and theoretical investigation of two-ray amplifying and multiplying tubes were given in the communication by L.Z. Aitova, V.M. Lopukhin, L.A. Shkudova and in the communication of V.I. Kanayets. Some of the papers in the Electronics Section dealt with the investigations which were concerned with the development of novel U.H.F. devices, suitable for the generation and amplification of the wave-forms in the millimetre and sub-millimetre ranges. The papers of great interest were: "Experimental Investigations of the Radiation of the Electron Bunches in the Vicinity of Non-homogeneities" by V.S. Braginskiy and Yu.F. Bassl', "Comparison of the Efficiency of Certain Methods of the Generation of Millimetre Waves" by A.B. Tager and "Application of the Higher Spatial Harmonics of the Electromagnetic Field in Slowing-down Systems" by L.B. Tager and V.A. Solntsev.

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MUSTEL', E.R., otv.red.; SILKIN, B.I., red.; YEGOROVA, N.F., tekhn.red.

[Observations of the sun] Nabliudeniia solntsa. Moskva, Izd-vo Akad.nauk SSSR, 1959. 37 p. (MIRA 13:1)

1. Russia (1923- U.S.S.R.) Mezhduvedomstvennyy komitet po provedeniyu Mezhdunarodnogo Geofizicheskogo Goda. 2. Chlen-korrespondent AN SSSR (for Mustel').
(Sun--Observations)

3(1)
AUTHORS: Mustel',E.R., and Mitropol'skaya,O.N. SOV/33-36-1-3/31

TITLE: On the Velocity Spectrum of Corpuscles in Solar Corpuscular Streams

PERIODICAL: Astronomicheskiy zhurnal,1959,Vol 36,Nr 1,pp 5-16 (USSR)

ABSTRACT: During 1951-1953 the velocity spectrum of corpuscles ejected from flocculi was investigated. Under the assumption that the velocity spectrum of corpuscles ejected from every point of the given flocculus is the same, the velocity v_1 of the fastest corpuscles and the velocity v_2 of the slowest corpuscles and the total range of velocities $\Delta v = v_1 - v_2$ was derived. The method of evaluation is described.
Basing on these results the connection of flocculi with geomagnetic activity established in a previous paper [Ref 6] was revised. The passage of flocculi over the visible center of the solar disk explains not only the rise of disturbances but also the appearance and disappearance of geomagnetic sequences during the appearance of new flocculi and correspondingly the disappearance of old flocculi, and further the appearance, disappearance, strengthening and weakening of geomagnetic sequences

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On the Velocity Spectrum of Corpuscles in Solar Corpuscular Streams SOV/33-36-1-3/31

during the change of sign of the heliographic latitude B_o of the disk's center. The paper contains an extensive discussion of the results and a number of conclusions.
There are 2 figures, and 19 references, 12 of which are Soviet, 4 American, 2 English, and 1 French.

ASSOCIATION: Astronomicheskiy sovet Akademii nauk SSSR (Astronomic Council AS USSR)

SUBMITTED: November 3, 1958

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3(1), 3(6)

AUTHOR: Mustel', E.R.

SOV/33-36-2-3/27

TITLE: Statistical Effects Due to the Connection Between F... Geomagnetic Disturbances

PERIODICAL: Astronomicheskiy zhurnal,1959,Vol 36,Nr 2,pp 215-223 (USSR)

ABSTRACT: The author investigates the statistical effects resulting from the connection between flocculi and geomagnetic disturbances, established by him in [Ref 4]. The main results of the detailed investigation are as follows : a)Flocculi, which at the moment of CMP are near the center of the solar disk, are the principal source of M-disturbances. b) Active regions have in reality a tendency to be located frequently in two longitudinal zones divided by an interval $\Delta L > 100^{\circ}$. - The author mentions O.N. Mitropol'skaya. - There are 4 figures, and 17 references, 9 of which are Soviet, 4 American, and 4 English.

ASSOCIATION: Astronomicheskiy sovet Akademii nauk SSSR (Astronomical Council AS USSR)

SUBMITTED: January 27, 1959

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SOV/20-128-2-12/59

3(1)
AUTHOR: Mustel', E. R., Corresponding Member, AS USSR

TITLE: On the Main Source of Solar Corpuscular Currents

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 2, pp 265-268 (USSR)

ABSTRACT: The author first reports on various articles previously published on this subject. M-Disturbances are the main geomagnetic disturbances with respect to the number and, particularly, to the period assumed by them throughout the solar cycle. From the practical standpoint, the particle currents producing these disturbances are the principal kind of currents which disturb radiocommunication on short waves, produce aurorae boreales, etc. When entering into details of this problem, the mechanism of the emission of corpuscules from the flocculi is to be dealt with. This is the very problem that is investigated here in more detail. In the projection toward the sun's disk (in its central parts) the boundaries of the flocculus approximately coincide with the boundaries of the bright corona range over it in the line λ = 5303 Å and - which is particularly important - with the boundaries of the bipolar (or unipolar)

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magnetic range. Thus, the problem is raised which of these three kinds of solar activity produces the emission of corpuscles: the floccular emission, the corona over the flocculus, or the local magnetic field over the active zone. According to observations, obviously the last factor is the essential one, i.e. the magnetic field. This is confirmed by the fact that in many cases the flocculus disappears before the long geomagnetic sequence of flocculi which it has produced. However, this sequence exists for two or three other rotations without being accompanied by any visible (optical) phenomena of solar activity on the corresponding longitude. The local magnetic field, however, shows normal behavior. After the disappearance of all "optical" kinds of solar activity (flocculus spots, bright corona radiation, etc), the bipolar magnetic field that had existed there so far is replaced by a unipolar field, which is then observable during some rotations. The following conclusions may be drawn herefrom: The emission of particles from the active zone is really determined by its magnetic field, and the last members of the geomagnetic sequences (which are observable without the existence of flocculi and a bright corona at λ = 5303 Å) are conditioned by unipolar

magnetic zones. This conclusion is obviously confirmed by a direct comparison of geomagnetic disturbances with flocculi and the local magnetic zones on the sun. According to the conclusions drawn in this article, the projection of corpuscles is determined only by the existence of a local magnetic field within the active zone, i.e. irrespective of its nature (bipolar or unipolar) and sign. However, the diamagnetic mechanism is not the only solution possible for this problem. In conclusion, the author points out several facts and factors which are important in this connection. There are 17 references, 12 of which are Soviet.

ASSOCIATION: Astronomicheskiy sovet Akademii nauk SSSR (Astronomical Council of the Academy of Sciences, USSR)

SUBMITTED: June 5, 1959

S/035/60/000/009/006/016
A001/A001

3,1560

Translation from: Referativnyy zhurnal, Astronomiya i Geodeziya, 1960, No. 9 pp. 31-32, # 8838

AUTHOR: Mustel', E.R.

TITLE: The Problem of Outflow of Substance from Stationary Stars. Part 3. A Study of the Shell Created by the Star Corpuscular Emission

PERIODICAL: Izv. Krymsk. astrofiz. observ., 1959, Vol. 21, pp. 24-39 (Engl. summary)

TEXT: The results are presented of the numerical solution of motion of a shell created by the corpuscular emission of a star, which is expanding in inter-stellar medium. The equation proper was derived by the author earlier (RZhAstr, 1959, No. 3, # 1887). Solutions of the equation are found for a number of variants, corresponding to various parameter values, by means of a high-speed electronic computer "Strela". The results are tabulated and presented graphically. The question is discussed on visual effects which can be produced by the shell under consideration. The calculations show that the shell should be ob-

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S/035/60/000/009/006/016
A001/A001

The Problem of Outflow of Substance from Stationary Stars. Part 3. A Study of the Shell Created by the Star Corpuscular Emission

servable. Moreover, the shell should deform or destroy the fields of HII around O- and B-stars. The visual effects mentioned are not observed. In this connection, the author holds that the results of this study indicate the absence of intense outflow of gases from the surfaces of hot stars, including Wolf-Rayet stars. This conclusion is of a preliminary nature.

I.N. Minin

Translator's note: This is the full translation of the original Russian abstract.

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S/035/60/000/009/007/016
A001/A001

3,1560 (1050, 1172, 1189)

Translation from: Referativnyy zhurnal, Astronomiya i Geodeziya, 1960, No. 9, pp. 34-35, # 8853

AUTHORS: Mustel', E.R., Boyarchuk, M.Ye.

TITLE: On Chemical Composition of the Atmosphere of N Her 1934

PERIODICAL: Izv. Krymsk. astrofiz. observ., 1959, Vol. 21, pp. 3-23 (Engl. summary)

TEXT: The chemical composition of the N Her 1934 atmosphere is determined for the maximum brightness instant, as well as that of 7 comparison stars: α Cyg A2Ia, δ Del A7III, γ Her A9III, ν Her F2II, HD 110628 F 2III, 41 Cyg F5II and γ Cyg F8Ib. The method of growth curves was employed. Spectrograms taken with the 40'' telescope of the Simeiz Observatory with a dispersion of 36 A/mm for Hγ were used. The comparison of the chemical composition of N Her 1934 with the average "standard" chemical composition reveals large anomalies in the content of C, N, O in the atmosphere of the Nova. The content of these elements in the N Her atmosphere is about 10^3 as great as in the "standard" composition. This result can not be explained by peculiarities in the conditions of atom excitation. The region of the

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29(0) SOV/25-59-2-2/48

AUTHOR: Mustel', E.R., Corresponding Member of AS of USSR

TITLE: A New Planet of the Solar System (Novaya planeta solnechnoy sistemy)

PERIODICAL: Nauka i zhizn', 1959, Nr 2, p 2-6 (USSR)

ABSTRACT: The article deals with a series of problems, the solution of which now seems possible due to the launching of the Soviet sun satellite on 3 January 1959. Such problems are the influence of the magnetic fields of corpuscular radiation on the intensity of cosmic rays, the interaction of corpuscular rays and interplanetary gas and dust (highly important for the study of disturbances of radio communication in higher latitudes), and the characteristics and composition of interstellar matter. In order to resolve such problems, various devices such as counters of charged

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A New Planet of the Solar System

moon and to measure from various distances the magnetic storms, and the aurora polaris. For the study of meteors, two ballistic piezoelectric counters of ammonium phosphate were installed on the shell of the space rocket (photo Nr 2). These counters recorded the impacts of micrometeoric particles. There are 4 photos, 1 diagram and 1 chart.

3(0) SOV/30-59-8-32/56

AUTHORS: Mustel', E. R., Corresponding Member, Academy of Sciences, USSR, Yegorova, N. B.

TITLE: Solar Studies and the Tasks of Geophysics

PERIODICAL: Vestnik Akademii nauk SSSR, 1959, Nr 8, pp 87-89 (USSR)

ABSTRACT: From May 18 to 22 an extended plenary session of the Komissiya po issledovaniyu Solntsa pri Astronomicheskom sovete Akademii nauk SSSR (Commission of Solar Studies of the Astronomy Council of the Academy of Sciences, USSR) was held in Leningrad. It was devoted to the discussion of essential questions of solar physics and the effect of its processes upon geophysical phenomena. The main task of the meeting was the development of research projects aimed at the study of the connection between solar and terrestrial phenomena in accordance with the astronomical and geophysical data furnished by the International Geophysical Year. In addition, the following papers were read: E. R. Mustel' and collaborators of the Crimean Astrophysical Observatory reported that the flocculi were one of the foremost sources of the corpuscle outburst of the sun, as was confirmed by statistical investigations carried out by O. N. Mitropol'skaya. S. K. Vsekhsvyatskiy assumes that

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the source of corpuscles is to be found in the corona of the sun. V. V. Vitkevich reported on observations of the "super-corona" of the sun. M. S. Bobrov reported on the findings of research into the structure of corpuscle currents. M. N. Gnevyshev reported on the relationship between the solar coronary radiation and the magnetic storms on the earth. N. A. Savich confirmed the fact that the X-rays of the chromosphere explosions were to be considered the cause of the sudden storms in the ionosphere. V. I. Krasovskiy, I. S. Shklovskiy, Yu. I. Gal'perin, Ye. M. Svetlitskiy reported on the force and the energetic spectrum of the corpuscles in the upper atmosphere on the basis of the data obtained by the third artificial Soviet earth satellite. B. M. Rubashev, L. A. Vitel's, M. S. Eygenson, T. L. Mandrykina and G. N. Rodionov spoke on the statistical interdependence between the oscillations of solar activity and the state of the troposphere. A. B. Severnyy and N. V. Steshenko discussed questions of solar physics. V. Ye. Stepanov reported on movements in various parts of the chromosphere. M. Z. Khokhlov reported on the finding of the forces of the oscillators of some lead lines and the lead content of the solar atmosphere. M. Kerimbekov spoke on filming the granulation. V. A. Krat reported on the physics

MUSTEL', E.R.

Source of corpuscules creating the M perturbations. Astron.tsir. no.213:5-8 Jl '60. (MIRA 14:1)

1. Astronomicheskiy sovet AN SSSR.
(Magnetic storms) (Suh)

93826

S/033/60/037/02/002/013
E032/E914

3.9100
3.1550

AUTHOR: Mustel', E. R.

TITLE: The Total Energy Contained in Corpuscular Streams.

PERIODICAL: Astronomicheskiy zhurnal, Vol 37, Nr 2, pp 210-221 (USSR)
1960.

ABSTRACT: (For previous papers see Refs 1-5). Further arguments are given in favour of the hypothesis that in many cases a considerable fraction of the total energy in corpuscular streams emitted by the sun is determined by the magnetic field "frozen" in the condensations and not by the translational kinetic energy of the particles. A preliminary discussion of this problem was given by the present author in Ref 1. In the present paper that discussion is amplified and only M-disturbances are considered. It is argued that the long period of geomagnetic disturbances at the end of a sun spot cycle is due to particles, which at that time have small velocities, and not to after-effects in the Earth's atmosphere. The 'flat top' disturbances (Fig 1) which are often observed at this time, and irregular variations in the magnetic field are reconsidered. It is shown

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The Total Energy Contained in Corpuscular Streams

again that the most probable explanation of these disturbances is that the energy density of the "frozen-in" magnetic field is much greater than the kinetic energy (Eq 5), or at least that the kinetic energy is just less than the magnetic energy. On the way from the sun to the Earth, the corpuscular condensations should expand because of internal magnetic pressure, so that the magnetic density energy should decrease in each of the condensations. If the rapid expansion process is not concluded before the condensations reach the Earth, then condensations producing the end of the disturbances (and taking more time to reach the Earth) should on the average have a smaller magnetic energy density than the condensations causing the beginning of the disturbance. It would therefore be expected that quite frequently the amplitude of the magnetic field variations should increase towards the end of the disturbance and this is in

The Total Energy Contained in Corpuscular Streams

fact observed. Occasionally, long period M-disturbances contain more energy than disturbances with a small ΔT. Two factors may play an important role here. At the end of the solar cycle, when large ΔT are observed, the structure of the corpuscular streams should be particularly simple and the magnetic lines of force in the condensations are not as entangled as they are otherwise. Therefore, the efficiency of interaction between the condensations and the Earth's magnetic field should in such cases be a maximum. On the other hand, disturbances with large ΔT correspond to small particle velocity, and this means that the time of interaction between a condensation and the Earth's magnetic field should be longer than for disturbances with a small ΔT. Both these factors naturally explain the absence of a close connection between the intensity of a plage and the corresponding magnetic disturbance, provided it is assumed that the magnetic energy density is much smaller than the translational kinetic energy density. In conclusion, the

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The Total Energy Contained in Corpuscular Streams

role of the "frozen in" magnetic field in corpuscular streams from chromospheric flares is briefly considered. The presence of this field may explain some of the important properties of the main phase of SC-disturbances. In particular, this may have a bearing on the slow recovery of the Earth's normal field after a rapid decrease in the horizontal component. Thus if there is a velocity spread in the stream due to a chromospheric flare, the beginning of the disturbance corresponds to the faster particles. It follows that, owing to the expansion effect, the kinetic and magnetic energy densities will be greater at the beginning of the disturbance than at the end. There is 1 figure and 16 references, of which 1 is Swedish, 2 English and 13 Soviet.

ASSOCIATION: Astronomicheskiy sovet Akademii nauk SSSR (Astronomical Institute Academy of Sciences USSR)

SUBMITTED: December 8, 1959.

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3.9100
3.1540

81833

S/037/60/037/03/001/027
E032/E314

AUTHOR: Mustel', E.R.

TITLE: On the Existence of a General Field of Corpuscles Emitted by the Sun

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol 37, No 3, pp 396-402 (USSR)

ABSTRACT: It has been argued (the author et al - Refs 1-7) that the main source of corpuscles producing M-disturbances are active regions of the Sun. In most of these papers use was made of calcium plages. The reasons for this is that the Ca^{+} emission is the most easily recorded. It also gives the best definition of the outer contours of an active region. In general, the three most stable elements which characterise each active region during its development are 1) floccular emission, 2) enhanced coronal emission in λ 5503, and 3) local magnetic field which is first bipolar and then, towards the end, unipolar. The local magnetic field is the most stable element of an active region and apparently determines the process of ejection of corpuscles. All the three elements have, in projection on the solar disc the same heliographic coordinates and differ (in the sense of localisation)

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On the Existence of a General Field of Corpuscles Emitted by the Sun

only in altitude. Thus, coronal emission takes place at a higher level than chromospheric emission, and so on. All this means that the instant of passage of an active region through the Central Meridian should turn out to be the same, whichever of the above three elements is used to determine this instant. Bearing this in mind, the following defintion of a source of M-corpuscles can be given. Almost every active region (including the UV phase), even when there is no chromospheric emission and radiospot activity in it, is a permanent source of relatively slow particles moving in an approximately radial direction. From the point of view of this definition, there is no point in contrasting plages with bright coronal regions (if one is only concerned with the localisation of the source of corpuscles on the solar disc). The only statement that can be made is that the magnetic field (unipolar) exists slightly longer than the floccular and enhanced coronal emission. The above definition and its consequences are then compared and contrasted with the theories of Vsekhsvyatskiy et al (Ref 9),

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Allen (Ref 10), Pecker and Roberts (Ref 11), Bell and Glazer (Ref 12) and others. If the present interpretation is accepted then there is no necessity to introduce large concentrations of corpuscles in the streams emitted by the Sun. It is concluded that available observational material can be interpreted by assuming that a general corpuscular field does exist but the concentration is smaller by several orders of magnitude than that suggested in Refs (9) and (19), in which it is argued that $n_e \approx 10^3$ cm^{-3}. This means that hypotheses according to which the origin of geomagnetic disturbances is due to the existence of an intense general corpuscular field are now very much less acceptable.
There are 1 figure and 29 references, 8 of which are English, 1 German, 1 Swedish and 19 Soviet.

ASSOCIATION: Astronomicheskiy Sovet Akademii nauk SSSR
(Astronomical Council of the Ac.Sc., USSR)

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SUBMITTED: February 25, 1960

81834
S/033/60/037/03/002/027
E032/E314

3.9100

AUTHOR: Mustel', E.R.

TITLE: On Corpuscular Velocities in Streams Responsible for M-disturbances

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol 37, No 3, pp 403-407 (USSR)

ABSTRACT: The present paper is concerned with the fact that very frequenctly the time lag Δt of all the members of a geomagnetic sequence remains approximately constant. Δt is constant in spite of the fact that the physical state of the active region giving rise to the geomagnetic sequence can undergo, during the existence of the latter very strong variations (from a very bright plage with strong coronal λ 5303 emission to a unipolar region without floccular and bright λ 5303 emission). In general, the time of commencement of a disturbance in a sequence, as estimated from the formula $t = t_o + 27^d \times n$, is not related to the intensity variations in the disturbance (when the effect of variations in B_o is taken into account). Moreover, a change in the physical state of an active region should lead to a noticeable change in the

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On Corpuscular Velocities in Streams Responsible for M-disturbances

corpuscular velocity v in the stream from one revolution to the next and thus give rise to very noticeable changes in Δt (cf Ref 1). In view of these facts, it is concluded that each corpuscular stream above the active region consists of a collection of relatively stable magnetic tubes of force. This conclusion is in agreement with the results reported by Bugoslavskaya (Ref 7), who showed that straight intense rays emerge from facular regions. In the case under consideration the velocity of motion of gases v along the tubes may be much smaller than the velocity calculated by Chapman (Ref 5). Approximate calculations carried out using Eq (4) show that field strengths of the order of 10^{-4} - 10^{-5} Oe are sufficient to carry away (during rotation of the sun) all the matter included in these tubes. It is argued that the velocity of gases inside these tubes can frequently be rather small. The problem of the appearance and disappearance of tubes of force is also discussed. These tubes are apparently produced during the initial stage of development of an active region. It is pointed out

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On Corpuscular Velocities in Streams Responsible for M-disturbances

that the absence of stability in coronal tubes associated with active regions of types E and F may lead to the absence of M-disturbances from these regions. According to the model used in the present paper, the main velocity of corpuscles relative to Earth is the transverse velocity V which is of the order of 400 km/s. This can also explain (see Refs 1, 3) the rectangular character of many of the M-disturbances. Moreover, the position of the vector V may apparently give a more natural explanation of the fact that M-disturbances commence in the second half of the day according to local time. It is argued that the transverse motion of magnetic tubes should not lead to an appreciable transverse motion of gases in cometary tails. There are 1 figure and 10 Soviet references.

ASSOCIATION: Astronomicheskiy Sovet Akademii nauk SSSR
(Astronomical Council of the Ac.Sc., USSR)

SUBMITTED: March 4, 1960

Card3/3

PHASE I BOOK EXPLOITATION SOV/5154

Mustel', Eval'd Rudol'fovich

Zvezdnyye atmosfery (Stellar Atmospheres) Moscow, Fizmatgiz, 1960. 444 p. 2,500 copies printed. (Series: Problemy teoreticheskoy astrofiziki)

Editorial Board: V.A. Ambartsumyan, E.R. Mustel', A.B. Severnyy, and V.V. Sobolev; Ed.: B.Ye. Gel'fgat; Tech. Ed.: V.N. Kryuchkova.

PURPOSE: This book is intended for astronomers and astrophysicists.

COVERAGE: This book on the properties of stellar atmospheres is the first of a multivolume work to be published in the next few years under the general title, Problemy teoreticheskoy astrofiziki (Problems of Theoretical Astrophysics). Individual volumes in the series will include: Fizika Solntsa (Physics of the Sun), Planetarnyye tumannosti (Planetary Nebulae), Nestatsionarnyye zvezdy (Nonstationary Stars), Meshzvezdnaya sreda (Interstellar Medium), Zvezdnyye sistemy (Star Systems), Fizicheskiye problemy vozdeystviya Solntsa na Zemlyu (Physical Problems Concerning the Effects of the Sun on the Earth), and Atmosfery planet

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MIKHAYLOV, A.A., otv.red.; ZVEREV, M.S., red.; KULIKOVSKIY, P.G., red.; MASEVICH, A.G., red.; MUSTEL', E.R., red.; SOBOLEV, V.V., red.; SUBBOTIN, M.F., red.; SAMSONENKO, L.V., red.; TUMARKINA, N.A., tekhn.red.

[Astronomy in the U.S.S.R. during forty years 1917-1957; collected articles] Astronomiia v SSSR za sorok let, 1917-1957; sbornik statei. Red.kollegiia: A.A.Mikhailov i dr. Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1960. 728 p.

(MIRA 13:7)

(Astronomy--History)

BENDRIKOV, G.A.; KRASNUSHKIN, P.Ye.; REYKHRUDEL', E.M.; POTEMKIN, V.V.; MUSTEL', Ye.R.; RZHEVKIN, K.S.; IVANOV, I.V.; KHARLAMOV, A.A.; TIKHONOV, Yu.V.; STRELKOVA, L.P.; KAPTSOV, L.N.; ORDANOVICH, A.Ye.; KHOKHLOV, R.V.; VORONIN, E.S.; BERESTOVSKIY, G.N.; KRASNOPEVTSEV, Yu.V.; MINAKOVA, I.I.; YASTREBTSEVA, T.N.; SEMENOV, A.A.; VINOGRADOVA, M.B.; KARPEYEV, G.A.; DRACHEV, L.A.; TROFIMOVA, N.B.; SIZOV, V.P.; RZHEVKIN, S.N.; VELIZHANINA, K.A.; NESTEROV, V.S.; SPIVAK, G.V., red.; NOSYREVA, I.A., red.; GEORGIYEVA, G.I., tekhn. red.

[Special physics practicum] Spetsial'nyi fizicheskii praktikum. Moskva, Izd-vo Mosk.univ. Vol.1. [Radio physics and electronics] Radiofizika i elektronika. Sost. pod red. G.V.Spivaka. 1960. 600 p. (MIRA 13:6)

1. Professorsko-prepodavatel'skiy kollektiv fizicheskogo fakul'teta Moskovskogo universiteta im. M.V.Lomonosova (for all except Spivak, Nosyreva, Georgiyeva).
(Radio) (Electronics)

22113

S/035/61/000/003/048/048
A001/A101

3,1540

AUTHORS: Mustel', E.R., Tsap, T.T.

TITLE: The spectrophotometry of bright conversions in H- and K-lines in spectra of sunspot nuclei

PERIODICAL: Referativnyy zhurnal, Astronomiya i Geodeziya, no. 3, 1961, 24, abstract 3A461 ("Izv. Krymsk. astrofiz. observ.", 1960, v. 22, 75-80, Engl. summary)

TEXT: The authors studied the profiles of emission lines K and H in the spectra of sunspot nuclei. All records of sunspot spectra show a slight asymmetry in the upper part which is apparently due to the Evershed effect. The profiles of the singular conversion of the K line of Ca II in the spectra of three sunspots are well represented by the formula:

$$I_\nu = P_\nu \left[1 - \exp\left(-s_\nu N_1 (\text{Ca II})\right)\right]$$

with turbulent velocity $v_t = 0$ and the value of $N_1 \approx 4 \times 10^{15}$ cm^{-2}

From author's summary

[Abstracter's note: Complete translation]

Card 1/1

23699

S/035/61/000/004/029/058
A001/A101

3,1560

AUTHORS: Mustel', E.R., Kumaygorodskaya, R.N.

TITLE: On the origination mechanism of emission bands in spectrum of Nova Herculis 1934 and physical conditions in its envelope

PERIODICAL: Referativnyy zhurnal. Astronomiya i Geodeziya, no. 4, 1961, 34, abstract 4A345 ("Izv. Krymsk. astrofiz. observ.", 1960, v. 22, 207-224, Engl. summary)

TEXT: The authors discuss the problem of the mechanism producing bright lines in spectrum of Nova Herculis 1934. They are of the opinion that the main process leading to origination of bright lines in the star main spectrum is scattering of radiation of the extended envelope by the main envelope accompanied by fluorescence. Changes in contours of lines [O I] and H I observed in the spectrum of Nova Herculis are explained. The border parts of bright bands ("peaks") were created by two gaseous condensations situated diametrically, and the central parts of the bands by the extended envelope. Variations in the power of matter ejection by the

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23699

On the origination mechanism ... S/035/61/000/004/029/058
A001/A101

star changed the ratio of the band edges to their central parts. Electronic density and electronic temperature in the envelope of Nova Herculis in February 1935 were estimated from the ratio of intensities of the [O I] lines. There are 18 references.

V. Gorbatskiy

[Abstracter's note: Complete translation]

Card 2/2

22372

S/035/61/000/005/003/042
A001/A101

3,1560

AUTHORS: Mustel', E.R., Galkin, L.S.

TITLE: The spectrometric studying of hydrogen lines in spectra of peculiar stars of class A0. Part I. Hydrogen lines in spectra of "manganese", "silicon" and "magnesium" stars

PERIODICAL: Referativnyy zhurnal. Astronomiya i Geodeziya, no. 5, 1961, 22, abstract 5A149 ("Izv. Krymsk. astrofiz. observ.", 1960, v. 22, 225-233, Engl. summary)

TEXT: The authors studied the contours of hydrogen lines in spectra of ten peculiar stars of class A0 with enhanced lines of manganese, silicon and magnesium. They obtained hydrogen line contours in spectra of eight comparison stars of classes B9 - A1. Equivalent widths of hydrogen lines Hβ, Hγ, Hδ, Hε, Hζ and K-line (Ca II) were determined for all stars studied. The contours of hydrogen lines in spectra of "silicon" stars are identical to the contours of corresponding hydrogen lines in the spectra of comparison stars of class A0 V. The contours of hydrogen lines in spectra of "manganese" and "magnesium" stars

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22372

The spectrometric studying of hydrogen lines ... S/035/61/000/005/003/042
A001/A101

studied are shallower and narrower than the corresponding hydrogen lines in the spectra of comparison stars of class A0 III. This indicates either the relatively high luminosity of the stars considered or specific conditions in their atmospheres.

From author's summary

[Abstracter's note: Complete translation]

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22375
S/035/61/000/005/007/042
A001/A101

3,1560

AUTHORS: Mustel', E.R., Galkin, L.S.

TITLE: The spectrophotometric study of hydrogen lines in spectra of peculiar stars of class A. Part II

PERIODICAL: Referativnyy zhurnal. Astronomiya i Geodeziya, no. 5, 1961, 32, abstract 5A227 ("Izv. Krymsk. astrofiz. observ.", 1960, v. 24, 78-90, Engl. summary)

TEXT: This is the continuation of the authors' study (RZhAstr, 1955, no. 10, 4276; 1956, no. 9, 5047). Balmer absorption lines in spectra of A-class peculiar stars are studied. The authors present lists of peculiar and normal stars, as well as the graphs of line profiles in spectra of peculiar and standard stars. Each profile was plotted from several spectrograms, to increase their accuracy. The results of comparing the profiles of peculiar and standard stars are presented in graphical form; they show that in most cases the profiles of the Balmer series in the spectra of peculiar stars agree well with the corresponding profiles in the spectra of the normal stars of a similar spectral class. Thus, in all these cases, the structure of peculiar stars atmospheres can not apparently differ mark-

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The spectrophotometric study ...

edly from the structure of normal stars atmospheres of a similar class. To confirm additionally this conclusion, electronic pressure n_e (n_m) was determined for a number of stars studied by the formula: $\lg n_e = 23.26 - 7.5 \lg n_m$; the quantity $N_{02}H$ was determined by the formula: $N_{02}H = (mc^2/\pi e^2 \lambda^2 f) W_\lambda$, and the quantity $n_e(H\gamma)$ by the formula: $W_\lambda^5/\lambda^2 = kN_{02}Hn_e (R_c/0.45)^{3/2}$ assuming the value of $H_{02}H$ already calculated. All these parameters are presented in tables. Graphs are also presented illustrating the relations between $\lg n_e$ (n_m) and $\lg n_e$ ($H\gamma$), and between $\lg N_{02}H$ and $\lg n_e$ ($H\gamma$). The analysis of these graphs also confirms that apparently the structure of atmospheres of the most peculiar stars differs slightly from the structure of atmospheres of the normal stars of a similar class. It is noted that in some cases (e.g. α^2Psc) the profiles of Balmer lines of peculiar stars do differ noticeably from the corresponding profiles of the standard stars spectra. There are 9 references.

From authors' summary

[Abstracter's note: Complete translation]

Card 2/2

3.1540 (also 1151)

S/712/60/023/000/009/014
D218/D301

AUTHORS: Rustel', E. R. and Is'ap, T. T.

TITLE: Behavior of the bright reversal in the center of H and K Ca II lines in the region of a sunspot

SOURCE: Akademiya nauk SSSR. Krymskaya astrofizicheskaya observatoriya. Izvestiya, v. 23, Moscow, 1960, 299-303

TEXT: A continuation of earlier work. The authors report a more detailed study of the transition from double H and K lines of Ca II into single lines. To obtain these more detailed results, the profiles of the K line were investigated at different distances from the sunspot center. The spectra employed were obtained with the solar tower telescope at the Crimean Astrophysical Observatory with a dispersion of 0.192 A/mm. Photometric analysis of the K line for two sunspots reveals in a figure the absolute intensity Iv_3 as a function of distance from the sunspot center. It is found that this intensity has a minimum at the center of the umbra and

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increases on either side. These results can be explained in terms of the Evershed effect. Another figure shows the photometric tracing of the K line at different distances from the sunspot center. There are 5 figures and 2 Soviet-bloc references.

SUBMITTED: May 12, 1959

Card 2/2

MUSTEL, E. R.

"Coronal magnetic flux - tubes connected with the centers of activity as a possible source of M perturbations."

report to be submitted for the IAU Symposium on the Corona, Cloudcroft, New Mexico, 28-30 August 1961.

L 6696-65 EWT(1)/EWG(v)/EEC-4/EEC(t) Pe-5/Pq-4 AFETR/ESD(t) GW

55

ACCESSION NR: AR4043884 S/0269/63/000/011/0054/0054

SOURCE: Ref. zh. Astronomiya. Otdel'ny*y vy*pusk, Abs. 11.51.385

AUTHOR: Mustel', E. R.; Yegorova, N. B.

TITLE: Comparison of geomagnetic disturbances with solar phenomena 10

CITED SOURCE: Solnechn. korpuskulyarn. potoki, lokalizatsiya ikh istochnikov i svyaz' s geomagnitn. vozmushcheniyami. No. 1. M., AN SSSR, 1961, 5-35

TOPIC TAGS: geomagnetic activity, solar activity, magnetic storm

TRANSLATION: An attempt was made to directly compare geomagnetic activity with solar active centers during the period of the highest level of solar activity in the current 11-year cycle, viz., July 1, 1957 to January 2, 1959. A comparison was made of the synoptic charts of the Sun for each of the Sun's rotations (21) during the indicated period of time. On charts there were plotted, in addition to date and latitude, the flocculi passing through or near to the center of the disk, the moments of the

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beginning of Type IV bursts of radio-frequency radiation, the moments of the maxima of class 2 and 3 flares, and the index K. There were distinguished two basic types of magnetic storms: M-storms and sporadic storms. In attempts at unique comparisons, the authors were guided by previously derived conclusions, which reduced to the fact that sporadic storms follow chromospheric flares, and M-disturbances follow the passage of active regions across the central meridian. There is stressed the difficulty of unique comparison due to the great saturation of the Sun by active formations. On the basis of the conducted analysis it was established that the 27-day frequency of type M geomagnetic disturbances is expressed very weakly during this epoch, which is evidently connected with the instability of the regions, the nonstationarity of corpuscular streams, and the interaction between neighboring coronal formations, due to which the direction of the corpuscular streams can differ from radial. For the considered period it was possible to trace only two of the 27-day sequences. However, in the authors' opinion, even in this period of very high activity the basic sources of type M geomagnetic disturbances are flocculi passing through or near to the center of the solar disk. With respect to sporadic disturbances it is noted that in a number of cases class 2, not class 3, flares are the most active in the sense of generating such disturbances. The average delay time of a geomagnetic disturbance relative to a

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flare is ~2d. A disturbance of the geomagnetic field is by no means caused by all flares; it was not possible, however, to determine the difference between flares capable of causing a sporadic magnetic storm and those not causing a storm. Neither the position of the flare on the disk nor the connection with Type IV bursts of radio-frequency radiation are the determining factors here. Bibliography: 17 references.

SUB CODE: AA, ES ENCL: 00

Card 3/3

MUSTEL', E.R.

(Observatories of Meudon and Saint-Michel. Vest. AN SSSR 31 no. 2:69-
73 F '61. (MIRA 14:2)

1. Chlen-korrespondent AN SSSR.
(France--Astronomical observatories)

89320

3,9100 (1121 ONLY)
3,1800 (1041, 1062, 1178)

S/033/61/038/001/003/019
E032/E514

AUTHOR: Mustel', E. R.

TITLE: Results of a Statistical Study of Geomagnetic Disturbances for Five Cycles of Solar Activity

PERIODICAL: Astronomicheskiy zhurnal, 1961, Vol.38, No.1, pp.28-44

TEXT: In a number of previous papers concerned with the relation between active regions on the Sun and the geomagnetic M-disturbances the present author used a statistical approach based on the "method of superimposed epochs" (Refs. 1-5). However, only three cycles of solar activity, namely, 16, 17 and 18 were considered and, moreover, in the case of cycle No.17 only a limited period of time (1942-1944) was included. Furthermore, the statistical analysis requires a large volume of data if significant deductions are to be made. It was, therefore, decided to use the entire period for which calcium spectroheliograms are available at the various world observatories. This period includes five cycles of solar activity beginning at 1905. The data employed in the present analysis are tabulated in Table 1.

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